

$V_{RRM}$  = 650 V  
 $I_F (T_C=160^\circ\text{C})$  = 2 A  
 $Q_C$  = 6.8 nC

### Features

- Extremely low reverse current
- No reverse recovery current
- Temperature independent switching
- Positive temperature coefficient on  $V_F$
- Excellent surge current capability
- Low capacitive charge

### Benefits

- Essentially no switching losses
- System efficiency improvement over Si diodes
- Increased power density
- Enabling higher switching frequency
- Reduction of heat sink requirements
- System cost savings due to smaller magnetics
- Reduced EMI

### Applications

- Switch mode power supplies (SMPS)
- Uninterruptible power supplies
- Motor drivers
- Power factor correction

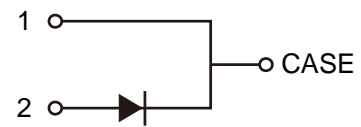
### Package Pin Definitions

- Pin1- Cathode
- Pin2- Anode

### Package Parameters

Part Number	Marking	Package
B1D02065K	B1D02065K	TO-220-2

TO-220-2 CASE



**Maximum Ratings ( $T_c=25^\circ\text{C}$  unless otherwise specified)**

Symbol	Parameter	Test conditions	Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage		650	V
$V_{RSM}$	Non-repetitive peak reverse voltage		650	V
$I_F$	Continuous forward current	$T_c=25^\circ\text{C}$ $T_c=160^\circ\text{C}$	9 2	A
$I_{FSM}$	Non-Repetitive forward surge current	$T_c=25^\circ\text{C}$ , $t_p=10\text{ms}$ , Half Sine Wave	16	A
$\int i^2 dt$	$i^2t$ value	$T_c=25^\circ\text{C}$ , $t_p=10\text{ms}$	1.28	A <sup>2</sup> S
$P_{tot}$	Power dissipation	$T_c=25^\circ\text{C}$ $T_c=110^\circ\text{C}$	43 18	W
$T_j$	Operating junction temperature		-55~175	$^\circ\text{C}$
$T_{stg}$	Storage temperature		-55~135	$^\circ\text{C}$
	TO-220 mounting torque	M3 Screw	0.7	Nm

**Thermal Characteristics**

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
$R_{th(jc)}$	Thermal resistance from junction to case		3.482		K/W

**Electrical Characteristics**
**Static Characteristics**

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{DC}$	DC blocking voltage	$T_j=25^{\circ}C$	650			V
$V_F$	Diode forward voltage	$I_F=2A$ $T_j=25^{\circ}C$ $I_F=2A$ $T_j=175^{\circ}C$		1.4 1.7		V
$I_R$	Reverse current	$V_R=650V$ $T_j=25^{\circ}C$ $V_R=650V$ $T_j=175^{\circ}C$		0.1 1		$\mu A$

**AC Characteristics**

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$Q_C$	Total capacitive charge	$V_R=400V$ $T_j=25^{\circ}C$ $Q_c = \int_0^{V_R} C(V)dV$		6.8		nC
$C$	Total capacitance	$V_R=1V$ $f=1MHz$ $V_R=300V$ $f=1MHz$ $V_R=600V$ $f=1MHz$		99 11.9 11.8		pF
$E_C$	Capacitance stored energy	$V_R=400V$		1.07		$\mu J$

Typical Performance

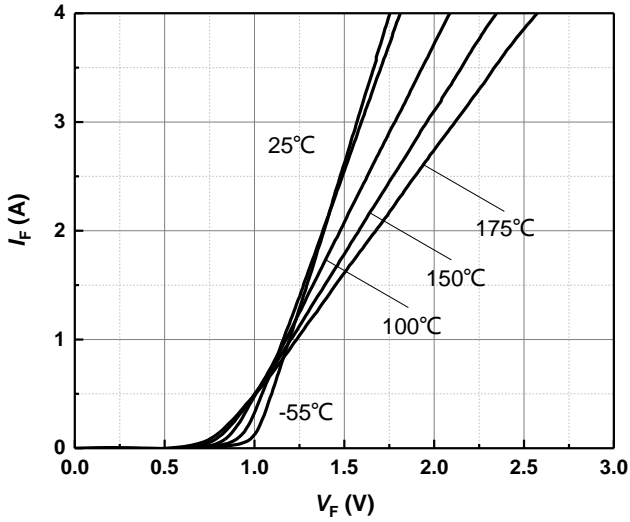


Figure 1. Typical forward characteristics

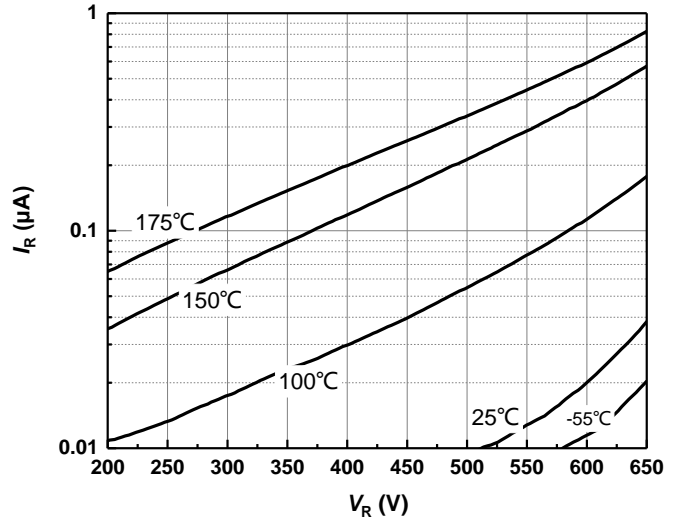


Figure 2. Typical reverse current as function of reverse voltage

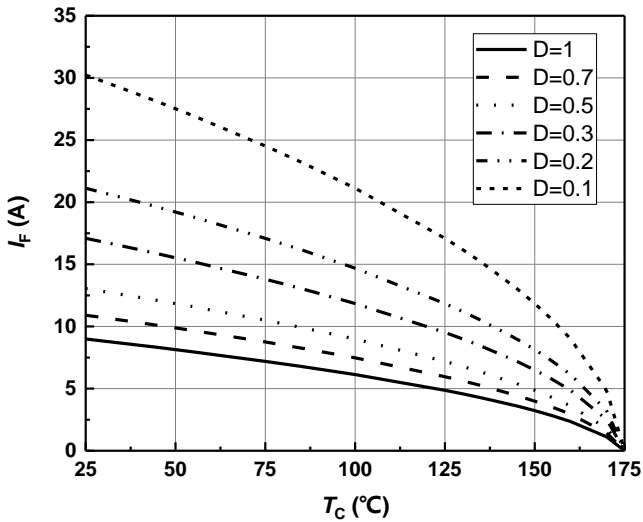


Figure 3. Diode forward current as function of temperature, D=duty cycle

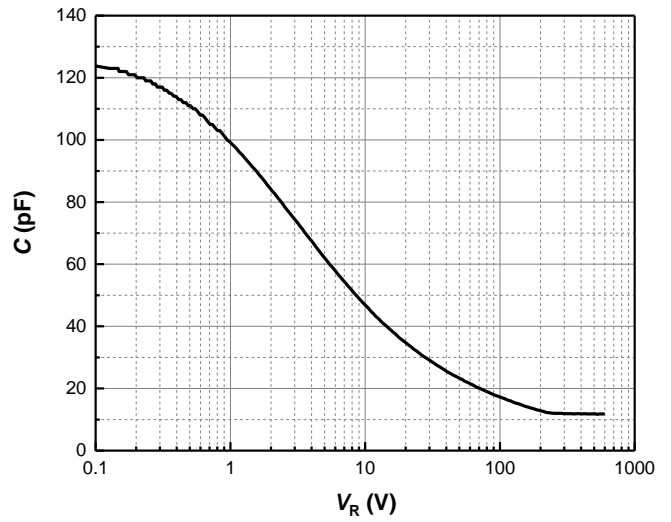
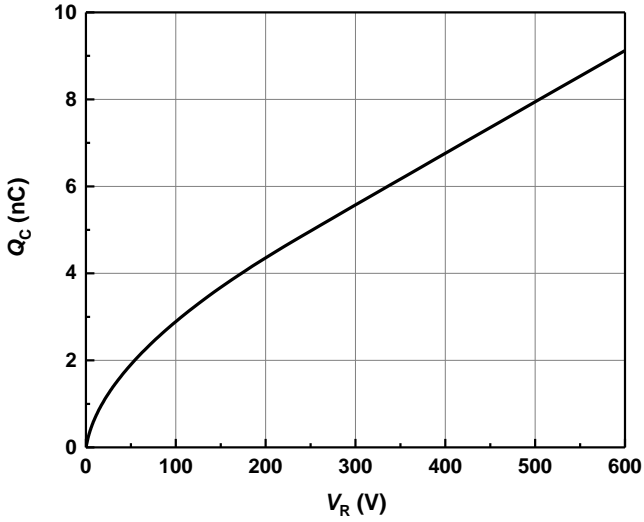
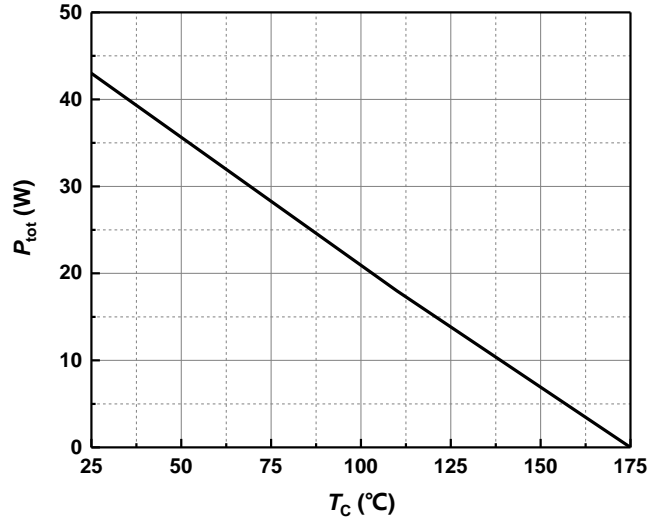


Figure 4. Typical capacitance as function of reverse voltage,  $C=f(V_R)$ ;  $T_J=25^\circ\text{C}$ ;  $f=1\text{ MHz}$

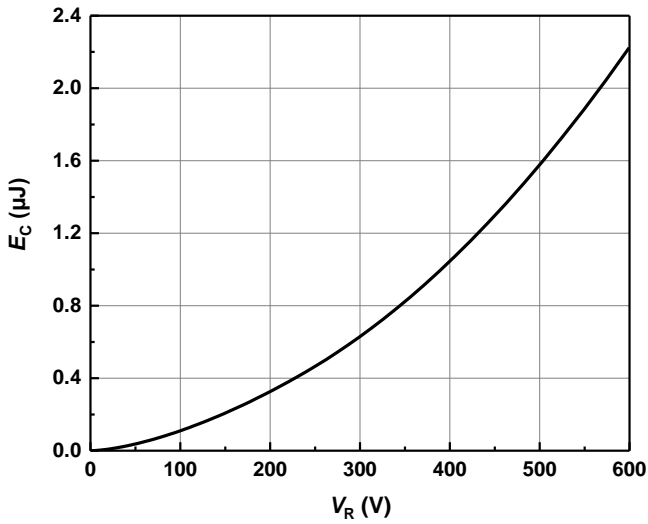
**Typical Performance**



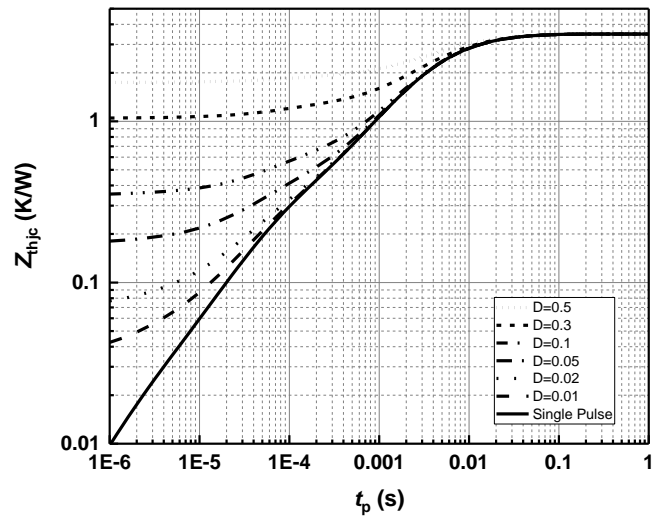
**Figure 5. Typical reverse charge as function of reverse voltage**



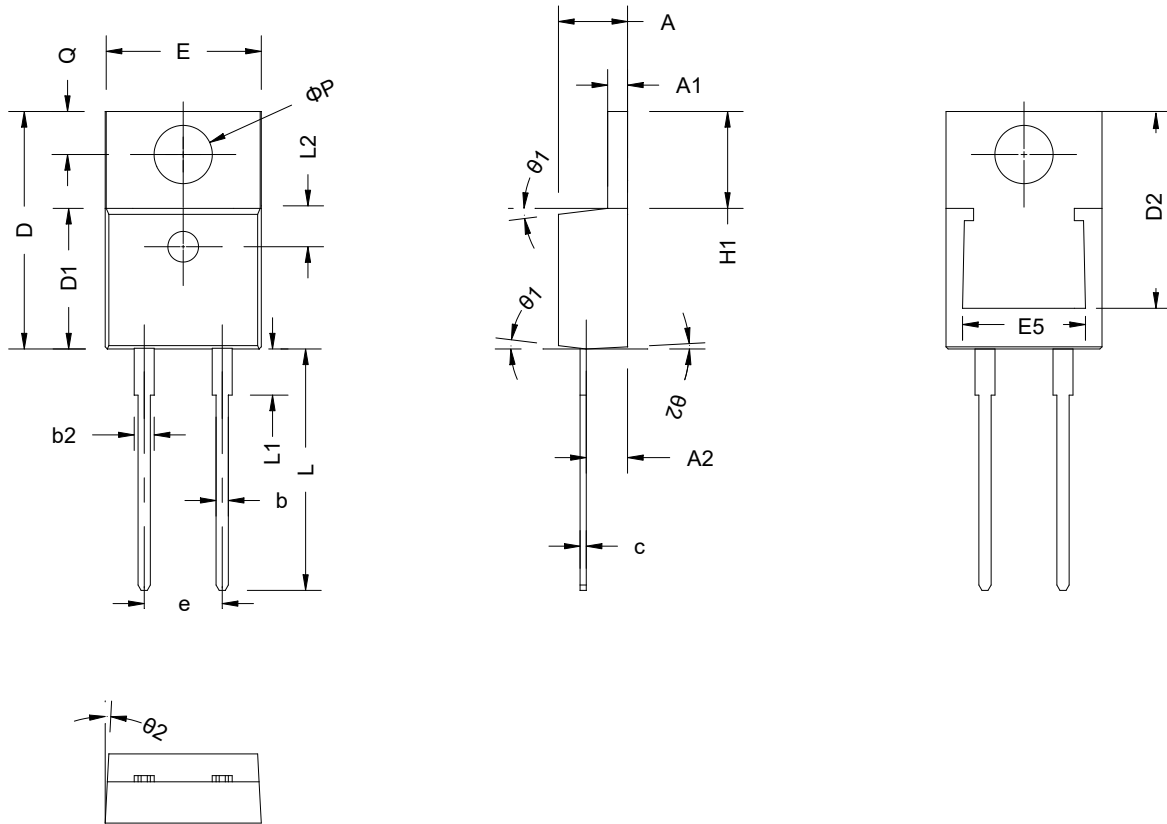
**Figure 6. Power dissipation as function of case temperature**



**Figure 7. Capacitance stored energy**



**Figure 8. Max. transient thermal impedance,  $Z_{thjc} = f(t)$ , parameter:  $D = t/T$**

**Package Dimensions**


SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.22	1.27	1.40
A2	2.49	2.69	2.87
b	0.75	0.81	0.96
b2	1.22	1.27	1.47
c	0.30	0.38	0.48
D	15.15	15.45	15.75
D1	9.05	9.15	9.25
D2	11.40	-	13.00
E	9.86	10.16	10.36
E5	7.60	-	8.20
e	4.98	5.08	5.18
H1	6.10	6.30	6.48
L	12.70	-	13.12
L1	2.80	-	3.30
L2	2.50 REF		
$\phi P$	3.70	3.84	3.99
Q	2.60	-	2.90
$\theta_1$	5°	7°	9°
$\theta_2$	1°	3°	5°

**Revision History**

<b>Document Version</b>	<b>Date of Release</b>	<b>Description of Changes</b>
Rev 1.0	2020-07-06	Release of the datasheet.

**BASiC Semiconductor Ltd.**  
Shenzhen, China  
© 2020 BASiC Semiconductor Ltd.  
All Rights Reserved.

**Information**

For further information on technology, delivery terms and conditions and prices, please contact the nearest BASiC Semiconductor Office

**Disclaimer**

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, BASiC semiconductor Ltd. hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.